Sandin Image Processor
Excerpts of Description of Analog IP modules Jeffrey Schier, in *Pioneers of Electronic Art*, 1992.

Sandin Image Processor
The Sandin IP is an analog video system designed by Dan Sandin, of the University of Illinois at Chicago Circle, to help art students visualize electronically using real-time tools. The design was initially supported by a grant for Innovations in Undergraduate Education in the Fall after Kent State. It was conceived as a visual analog to the Moog audio synthesizer.

The design philosophy was non-commercial; the IP was documented and plans for building were distributed by Sandin freely. These plans included detailed schematics and assembly information, allowing artists to build their own machines. Phil Morton was interested in copying the machine very soon after the prototype was working; he was instrumental in developing the documentation critical to the free distribution concept. Sandin estimated that at least 15 systems were built. The IP was probably the most widely build of all of the art video processing machines.

Sandin asked that people return the "energy", by sending back tapes completed on the system or by any other means. Sandin referred to this as the Distribution Religion. "The Image Processor may be copied by individuals and not-for-profit institutions without charge. For-profit institutions will have to negotiate for permission to copy. I think culture has to learn to use high-tex machines for personal aesthetic, religious, intuitive, comprehensive, exploratory growth. The development of machines like the Image Processor is part of this evolution. I am paid by the State, at least in part, to do and disseminate this information; so I do. As I am sure you (who are you) understand a work like developing and expanding the Image Processor requires much money and time. The 'U' does not have much money for evolutionary work and getting of grants are almost as much work as holding down a job. Therefore, I have the feeling that if considerable monies were to be made with a copy of the Image Processor, I would like some of it. Put in your own method of returning energy to me here: Of course enforcing such a request is too difficult to be bothered with. But let it be known that I consider it to be morally binding. Much love, Dan Sandin"

The system is an analog video processor, a collection of analog video imaging modules each of which was constructed to perform a specific process, resulting in a certain effect. Video signals are routed through the processing modules to a color encoder. The signals can then be recorded and displayed . The separate modules are housed in plain aluminum boxes which are stackable. The processing modules each have input and output connectors. The modules separate, amplify, create contour, read edges, key, superimpose, and colorize. Because the red, green and blue channels are handled separately, the user manipulated each channel individually, and a great deal of flexibility and control. The modules can be patched together to combine the separate processors, achieving complex processing techniques. The system was designed so that any module can be connected to any other without damage, encouraging broad experimentation.

The Sandin IP was presented in performance, Inconsecration of New Space, at the University of Illinois, January 23, 1973. Performers included Dan Sandin, Jim Wiseman and Philip Lee Morton. The performance incorporated the Sandin Image Processor built by Dan Sandin, the Paik Abe Video Synthesizer built by Jim Wiseman at California Institute of Arts, as well as cameras, film and videotape. Excerpts of Description of Analog IP modules Jeffrey Schier, in Pioneers of Electronic Art, 1992.

1.)A Camera Processor/Sync Stripper which takes a black and white video signal, DC restores it and outputs an amplified version without sync.

2) Adder / Multiplier which allows the combination, inversion mixing and keying of multiple image sources. The adder section can superimpose or invert the image polarity of multiple sets of incoming signals. The multiplier takes the two summed video sources and forms a linear mix between them. The mix or "key" control signal is externally supplied. A fast changing control acts as a gate or "key control." A slower changing control input causes a soft

mixing of the video inputs. A static control signal turns the multiplier into a “fader” unit, fading between the two sets of inputs.

3) Comparator - two inputs A and B are sent to a high gain video amplifier. This “discrete digital” output is developed if A is greater than B and runs at video speeds. With the comparator output sent to the control gate of the Adder/Multiplier, a hardedge keyer is formed.

4) Amplitude Classifier - A string of comparators is assembled to compare an input video signal against a ladder of brightness levels. The output of the classifier is 8 discrete “digital” channels, forming a set of intensity bands, corresponding to 8 contiguous grey levels evenly spaced from black to white.

5) Differentiator - this module generates an output signal based on the rate of change of the input signal. Six inputs with progressively larger time constants, respond to the edge rates of the input source. The shorter time constants respond to sharp horizontal edges, the larger time constants respond to softer edges.

6) Function Generator - a non-linear amplifier with an effect “more complex and controllable than photographic solarization.” Adjustments for negative, positive and near zero signals are possible through knob controls on the front panel

7) Reference Module - a collection of 9 potentiometers with nine corresponding output jacks. The potentiometers dialed control voltages needed to drive other analog processing modules.

8) Oscillator - a voltage controlled oscillator with sine, square and triangle outputs made available. The oscillator can be externally triggered to lock the oscillator phase to horizontal or vertical sync.

9) Color Encoder - an RGB to NTSC encoder, used as the final output stage, and constructed from a Sony DXC500B color camera encoder PC board. Two outputs are present: a monochrome output from the summed Red, Green and Blue inputs, and a color NTSC video signal formed from the RGB inputs. Wiring from the Amplitude Classifier through the adder/mixers to the color encoder results in a “threshold based colorizer. “ When driven from multiple Adder/Multipliers, a combination of monochrome and color images can be formed from oscillator waveforms and camera based sources.

10) NTSC Color Sync Generator - a stand alone NTSC color sync generator develops all needed synchronizing or sync signals to run the IP. Composite sync, slanking, surst-slag and subcarrier form the set of timings needed by the Color Encoder module. Horizontal and Vertical Drive signals are also generated to drive the timing of external black and white camera sources.

11) Power Supply - supplied all necessary power voltages to run the processing modules. +12, -12, +5, -5, and +14 were developed and run out on a “power bus” connecting the modules together.